

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application. Applicant believes that the changes effected herein add no new matter.

Listing of Claims:

1. (Currently Amended) A method of transmitting data in a wireless MC-CDMA system to a set of M users comprising the steps of:

Providing providing a transmitter system with N sub-carriers divided into G groups- , N and G being integers;

determining ~~the~~an instantaneous group SNR that is calculated using an effective channel function for each user in each group of sub-carriers- ; and

for each user and in each group of sub-carriers, using the instantaneous SNR of an equivalent single sub-carrier as a metric for resource allocation at the transmitter.

2.(Original) A method as in claim 1, further comprising:

receiving the data at the MC-CDMA receiver, and

demodulating the received data using a demodulator that corresponds to the resource allocated at the transmitter.

3. (Original) A method according to claim 1, in which ~~said~~user data bits are modulated with a modulation scheme corresponding to ~~said~~ that user's group SNR and spread in frequency over said sub-carriers belonging to ~~said~~ that user's group.

4.(Currently Amended) A method according to claim 3, further comprising, for each user comparing the instantaneous group SNR of each group of sub-carriers with a pre-defined set of switching thresholds to determine ~~the~~ bit allocations for the equivalent sub-carrier, and modulating each equivalent sub-carrier with a corresponding number of data bits, corresponding to ~~said~~ the user's group SNR.

5.(Currently Amended) A method according to claim 3, for each user using the instantaneous group SNR of ~~said~~ the user's group of sub-carriers, calculating ~~the~~ bit and power allocation for each equivalent sub-carrier and modulating each equivalent sub-carrier with a corresponding number of data bits, corresponding to ~~said~~ the user's group SNR.

6.(Original) A method according to claim 1, further comprising the step of, for each user and in each group of sub-carriers, regarding the instantaneous group SNR as the instantaneous SNR of an equivalent single sub-carrier to the group.

7.(Currently Amended) A method according to claim 4, in which

any groups of sub-carriers having a group SNR below a switching threshold are not modulated;

at least one group of sub-carriers having a first group SNR above said switching threshold is modulated with a first number of data bits according to a first modulation scheme; and

at least one group of sub-carriers of said G groups having a second group SNR next above said first group SNR is modulated with a second number of data bits according to a second modulation scheme; ~~and~~

~~the remaining members of said G groups of sub-carriers above thresholds separating group SNR regions are modulated with corresponding numbers of data bits according to corresponding modulation schemes.~~

8.(Original) A method according to claim 4, in which at least one switching threshold between at least two SNRs is chosen to satisfy a performance criterion of a system.

9.(Currently Amended) A method according to claim ~~7~~1, in which user data bits for each user in each group of modulated sub-carriers are modulated by a modulation scheme corresponding to the user's group SNR, then spread with a spreading code associated with that user, and loaded into the sub-carriers of the user's group.

10.(Cancelled)

11.(Currently Amended) A method according to claim 409, further comprising a step of adding the chips from all users synchronously across all the sub-carriers in said G groups, on a sub-carrier-by-sub-carrier basis and then transmitting an OFDM symbol formed by the addition of said chips.

12.(Currently Amended) A method according to claim 3, further comprising ~~a step of~~ calculating for each user an effective channel function;

~~Calculating~~ calculating from said effective channel function a group SNR of the sub-carriers in said effective channel function; and

comparing the instantaneous group SNR of each group of sub-carriers with a pre-defined set of switching thresholds to determine the bit allocations for the equivalent sub-carrier, and modulating each equivalent sub-carrier with a corresponding number of data bits, corresponding to said group SNR.

13-18.(Cancelled)

19.(Currently Amended) ~~A wireless MC-CDMA system transmitter~~ transmitter for wirelessly transmitting data to a set of M users comprising:

~~a transmitter with N sub-carriers divided into G groups, said transmitter having a modulator for modulating said N sub-carriers~~ that are divided into G groups, N and G being integers;-

~~_____ circuitry for calculating~~ Each of said G groups having an instantaneous group SNR ~~calculated~~ using an effective channel function for each user in each group of sub-carriers; and

~~Resource~~ resource allocation means ~~at said transmitter~~ for allocating, using said instantaneous SNR of an equivalent single sub-carrier as a metric, at least one resource for each user and in each group of sub-carriers.

20.(Currently Amended) A ~~system~~ transmitter as in claim 19, further comprising:

at least one MC-CDMA receiver for receiving the data over resources allocated using an instantaneous SNR of an equivalent single sub-carrier as a metric; and a demodulator that corresponds to the resource allocated resources at the transmitter for demodulating the received data.

21.(Currently Amended) A ~~system~~ transmitter according to claim 19, in which ~~said the modulator modulates~~ data bits are modulated with a modulation scheme corresponding to said group SNR, and the transmitter further comprising a spreader for spreading the unmodulated data bits spread in frequency over said sub-carriers belonging to said group.

22.(Currently Amended) A ~~system~~ transmitter according to claim 21, further comprising means for comparing the instantaneous group SNR of each group of sub-carriers received by each user with a pre-defined set of switching thresholds to determine the bit allocations for the equivalent sub-carriers of said each user; and

~~Modulation means for modulating the modulator operates to modulate each~~ equivalent sub-carrier with a ~~corresponding~~ number of data bits, corresponding to said group SNR.

23.(Currently Amended) A ~~system~~ transmitter according to claim 21, ~~further comprising means for calculating the~~ wherein the circuitry for calculating further calculates bit and power allocation, for each user using the instantaneous group SNR of each group of sub-carriers, for each equivalent sub-carrier and modulating each equivalent sub-carrier with a corresponding number of data bits, corresponding to said group SNR.

24.(Currently Amended) A ~~system~~ transmitter according to claim 19, ~~in which,~~ wherein the circuitry for calculating further calculates, for each user and in each group of sub-carriers, said SNR ~~is calculated by~~ regarding said instantaneous group SNR as the instantaneous SNR of an equivalent single sub-carrier.

25.(Currently Amended) A ~~system~~ transmitter according to claim 22, in which the modulator does not modulate any groups of sub-carriers having a group SNR below a switching threshold ~~are not modulated~~;

the modulator modulates with a first number of data bits according to a first modulation scheme atAt least one group of sub-carriers having a first group SNR above said switching threshold ~~is modulated with a first number of data bits according to a first modulation scheme~~; and

the modulator modulates with a second number of data bits according to a second modulation scheme at least one group of sub-carriers of said G groups having a second group SNR next above said first group SNR ~~is modulated with a second number of data bits according to a second modulation scheme~~; and
~~the remaining members of said G groups of sub-carriers above thresholds separating group SNR regions are modulated with corresponding numbers of data bits according to corresponding modulation schemes.~~

26.(Currently Amended) A ~~system~~ transmitter according to claim 22, in which the circuitry for calculating operates to select at least one switching threshold between at least two SNRs ~~is chosen so as to satisfy a performance criterion of a system~~.

27-28.(Cancelled)

29.(Currently Amended) A ~~system~~ transmitter according to claim ~~28~~20, further comprising means for adding ~~the~~ chips from all users synchronously across all the sub-carriers in said G groups, on a sub-carrier-by-sub-carrier basis and then transmitting an OFDM symbol formed by the addition of said chips.

30.(Currently Amended) A ~~system~~ transmitter according to claim 19, ~~further comprising means for calculating wherein the circuitry for calculating further calculates~~, for each user, said effective channel function and ~~calculating therefrom~~ said group SNR of the sub-carriers in said effective channel function.

31-40.(Cancelled)

41. (New) A transmitter according to claim 19 disposed in a mobile station.

42. (New) A transmitter according to claim 19 disposed in a base station of a cellular communication system.

43. (New) A program of machine-readable instructions, tangibly embodied on an information bearing medium and executable by a digital data processor, to perform actions directed toward transmitting data in a wireless multi-carrier spread spectrum communication system, the actions comprising:

providing a transmitter system with N sub-carriers divided into G groups, N and G being integers;

determining an instantaneous group SNR that is calculated using an effective channel function for each user in each group of sub-carriers; and

for each user and in each group of sub-carriers, using the instantaneous SNR of an equivalent single sub-carrier as a metric for resource allocation at the transmitter.

44.(New) A program of machine-readable instructions according to claim 43, wherein the actions further comprise:

receiving the data at the MC-CDMA receiver, and

demodulating the received data using a demodulator that corresponds to the resource allocated at the transmitter.

45. (New) A program of machine-readable instructions according to claim 43, in which user data bits are modulated with a modulation scheme corresponding to that user's group SNR and spread in frequency over said sub-carriers belonging to that user's group.

46.(New) A program of machine-readable instructions according to claim 45, wherein the actions further comprise:

for each user, comparing the instantaneous group SNR of each group of sub-carriers with a pre-defined set of switching thresholds to determine bit allocations for the equivalent sub-carrier; and

modulating each equivalent sub-carrier with a corresponding number of data bits, corresponding to the user's group SNR.

47.(New) A program of machine-readable instructions according to claim 45, wherein for each user using the instantaneous group SNR of the user's group of sub-carriers, calculating bit and power allocation for each equivalent sub-carrier and modulating each equivalent sub-carrier with a corresponding number of data bits, corresponding to the user's group SNR.

48.(New) A program of machine-readable instructions according to claim 43, wherein the actions further comprise:

for each user and in each group of sub-carriers, regarding the instantaneous group SNR as the instantaneous SNR of an equivalent single sub-carrier to the group.

49.(New) A program of machine-readable instructions according to claim 46, wherein the actions further comprise:

any groups of sub-carriers having a group SNR below a switching threshold are not modulated;

modulating at least one group of sub-carriers of said G groups, having a first group SNR above said switching threshold, with a first number of data bits according to a first modulation scheme;

modulating at least one group of sub-carriers of said G groups, having a second group SNR next above said first group SNR, with a second number of data bits according to a second modulation scheme; and

the actions not including modulating any groups of sub-carriers having a group SNR below a switching threshold.

50.(New) A program of machine-readable instructions according to claim 46, wherein the actions further include selecting at least one switching threshold between at least two SNRs so as to satisfy a performance criterion of a system.

51.(New) A program of machine-readable instructions according to claim 43, wherein the actions further comprise:

modulating user data bits for each user in each group of modulated sub-carriers by a modulation scheme corresponding to the user's group SNR; and

spreading the modulated user bits with a spreading code associated with that user; and

loading the spread and modulated user bits into the sub-carriers of the user's group.

52.(New) A program of machine-readable instructions according to claim 51, wherein the actions further comprise:

adding chips from all users synchronously across all the sub-carriers in said G groups, on a sub-carrier-by-sub-carrier basis; and

transmitting an OFDM symbol formed by the addition of said chips.